

FACTORS FOR THE ADOPTION OF AGRICULTURAL TOOL IN ENTREPRENEURSHIP SCHOOL IN THE NORTHEAST BENIN

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ABSTRACT

Agricultural entrepreneurship is today an effective way to make small farms businesses. The application booklet School Agricultural Entrepreneurship (EEA) containing tools for planning, management and monitoring-evaluation of the operation is part of this logic. This study aims to investigate the determinants of the degree of adoption of these tools using a Tobit model. Several factors determine the adoption of EAF tools including educational level, assistance with filling, access to credit and contact with an extension service. High attention to these factors by producer support structures should improve the degree of adoption of EAF tools.

KEYWORDS: Factors, Adoption, Tools-FBS, Northeast & Benin

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INTRODUCTION

Developing countries are characterized by a predominance of the agricultural sector (FAO, 2016). This sector accounts for nearly 80% of farms in sub-Saharan Africa and employs 75% of assets (Sall, 2015). It groups together the largest part of the active population and contributes significantly to the Gross Domestic Product (GDP) of developing countries. Small farms represent about 80% of all farms in sub-Saharan Africa and directly employ about 175 million people (Alliance for a Green Revolution in Africa, 2014). They are predominant in Asia and Africa; and home to about 2 billion people, including half of the world's undernourished population and the majority of people living in extreme poverty (IFPRI, 2005). Despite their high representativeness and the quantity of agricultural products from these farms, they remain uncompetitive, poorly organized and have difficulties in accessing the market and improved means of production. Not only do they miss out on new, high-value supply chains, but they have also lost access to modern inputs, credit and outlets in many countries, even for basic foodstuffs (Djurfeldt, Aryeetey and Isinika, 2011). To overcome these difficulties faced by small farms and to make them more competitive, they need to consider converting to agricultural entrepreneurship (Soullier et al., 2018). Better still, they can remain competitive in the market as full-time or part-time businesses, if the public sector supports them by investing in the kind of research, development, and infrastructure that can improve their competitiveness; Promoting farmer organizations to strengthen their bargaining power in the market (Hazell et al., 2007). Since the advent of the Structural Adjustment Program, which favored the withdrawal of the State from certain agricultural services, there has been a diversification of agricultural services (non-profit organizations, agricultural and private organizations), and an increase in the number of agricultural services; The role of beneficiaries in these systems (Moumouni and Labarthe, 2012). These contextual changes have revealed the limitations of the top-down approach of agricultural extension based on the dissemination of technical messages, such as the Trainings and Visits approach (Davis, 2008, Wallace, 1997, Birner et al., 2009). As a result, other

approaches have been developed by agricultural advisory research and development, essentially advocating the empowerment of farmers (Anandajayasekeram et al., 2008) and their financial contribution to the cost of the service (Moumouni et al., 2009). In addition, some approaches incorporated market-oriented agricultural advisory services (Chipeta, 2006), and others focused on family farm counseling, based on a holistic approach to farming (Faure et al., 2004. Djamen et al., 2003).

However, today, with the multiple challenges of agriculture, the professionalization of farms and their orientation towards agricultural entrepreneurship has proved indispensable. It is in this sense that the Agricultural Entrepreneurship School (EEA) approach developed by GIZ in 2010 through the Sustainable Cocoa Business (SCB) project. The goal of the EEA is to build the capacity of producers to better manage their operations by making them real entrepreneurs. The pilot phase of this approach has been carried out in pioneer countries including Ghana, Nigeria, Cameroon and Ivory Coast. In view of the encouraging results of this approach in these countries, several other countries have adopted it, namely Benin, Malawi, Togo and other countries to name but a few (Sogan, 2014).

In Benin, it was introduced in 2012 by the Program for the Promotion of Agriculture (ProAgri), a program implemented under the supervision of the Ministry of Agriculture, Livestock and Fisheries (MAEP), in connection with the strategic axis of the Strategic Plan for the Revival of the Agricultural Sector (PSRSA) which aims at the professionalization of family-type farms through agricultural entrepreneurship. This approach aims to make producers, especially small producers, real entrepreneurs in practice. The implementation of the approach in its pilot phase has been effective thanks to the cooperation of three partner structures (OGYA-Development, CEPI-Development and DEDRAS-NGO) which are regularly solicited by ProAgri. Initially adapted to the cotton, cashew and rice sectors, the teaching materials of the approach have been adapted to other sectors such as soya. ProAgri's interest in this approach was mainly confirmed by the encouraging results recorded after a pilot phase in the departments of Donga, Atacora, Borgou and Alibori in Benin in 2012 (Gantoli, 2013). However, it is clear that despite its encouraging results, producers noted poor performance in the filling of EEA application books. This is to know the determinants of this weak filling and to make available to the decision-makers, elements that will make it possible to improve the future interventions, that this article finds its interest. It aims to measure the frequency of filling of EEA tools and identify the factors determining the degree of filling of these tools.

Brief Overview of Benin's Experience in the EEA Approach

The Agricultural Entrepreneurship School was introduced in Benin in 2012 through the Agricultural Promotion Program (ProAgri), which is run by the Ministry of Agriculture, Livestock and Fisheries (MAEP). The diagnosis of the agricultural sector in Benin through the strategic plan for the revival of the agricultural sector (PSRSA) and that of the strategic development plan of the sector reveals that agricultural products are very competitive and producers' incomes are still low because of their low use of improved inputs (APRM, 2017). In addition, the professionalization of family-owned farms now appears to be the best option for growth and poverty reduction. Thus, to ensure a real structural change in the agricultural sector, the implementation of actions likely to bring a critical mass of farms of family type in a dynamics of professionalization, which ensures the good planning, the good financial management, good risk management, good organization and good market-oriented negotiation proved necessary. That is why, very early on, in view of the encouraging results of the Agricultural Entrepreneurship School in the pilot countries, it was deemed useful and necessary, thus being part of the dynamics of the country's agricultural policy in the promotion of agriculture.

The EEA approach aims to provide farmers with knowledge and skills in the planning and management of market-oriented agricultural activities through "faire-faire". In addition, different variants of EEA learning modules are promoted by various development organizations and implemented in sub-Saharan African countries (Snrd, 2015, Care, 2013, Giz, 2012 and GoM, 2011). Unlike Malawi where it was adopted nationwide as an extension approach (Chilemba and Ragasa, 2018), its implementation in Benin is small scale under the training request formulated (addressed to GIZ or directly to ProAgri) by an Agricultural Professional Organization (OPA) or, failing that, a group of beneficiaries or under the decision of the ProAgri to organize an EEA training. This approach, in line with the strategic axis of the Strategic Plan for the Development of the Agricultural Sector (PSDSA) aims at the professionalization of family-type farms through the agricultural entrepreneurship of young people and women. The implementation of the EEA in Benin through small training groups has been possible thanks to the support of partner structures among others DEDRAS-ONG. Indeed, networks of regional trainers are available and are challenged (by the partner structures) at the appropriate moment when the need to organize the training is felt. The initiation protocol of the training sessions includes the validation of the training request through the joint formulation / clarification of the training objectives, the selection of the participants, the development of the training program and the supervision plan and other provisions. Organizational and logistical (operational budget planning training material). The animation of the EEA training sessions is centered on the principles of andragogy and takes place the mornings (during 5 half-days) to ensure that the participants are the most concentrated / awake. The training takes place in the villages and takes into account the appropriate periods, often those during which the producers are available and less constrained to the country activities during the year.

The EEA training class usually contains about 30 producers, with a margin of plus or minus 5 persons, per training class of which 30% are literate and / or literate at most and at least 30% women. Producers must be farm managers and therefore have the ability to decide on the management of their farms. It is the producers themselves who take care of the logistics of the training, i.e., the preparation and the provision of the training rooms. They do not receive any per diem except for a certificate at the end of the serial number training for producers who have been regular. Several actors are also involved in the organization of these trainings including regional trainers (provide training in the field), supervisors (ensure the implementation of equipment and conditions required for proper training), focal points (contact points after training), master trainers (train regional trainers and supervisors) and Giz technical advisers (Design and adaptation of training materials, monitoring and quality). Monitoring and evaluation is done during and after the training and involves other actors such as the CARDER (Regional Action Center for Rural Development, replaced today by the Territorial Agencies for Agricultural Development) through the Municipal Sectors Agricultural Development (SCDA). In order to fill the gap related to the absence of a study on the analysis of the adoption factors of EEA tools in Benin, this study aims to highlight the factors that favor and limit the filling of tools in order to propose concrete actions for scaling up of EEA tools by producers.

MATERIEL AND METHODES

Study Zone

The study area is the commune of Tchaourou in the department of Borgou. The choice of this municipality is because it is because of its proximity and for the beneficiary of EEA training. The villages selected for the survey was chosen in relation to the presence of soybean producers who attended EEA training; the accessibility of the villages and finally the distance that separates the villages of the chief town of the Commune.

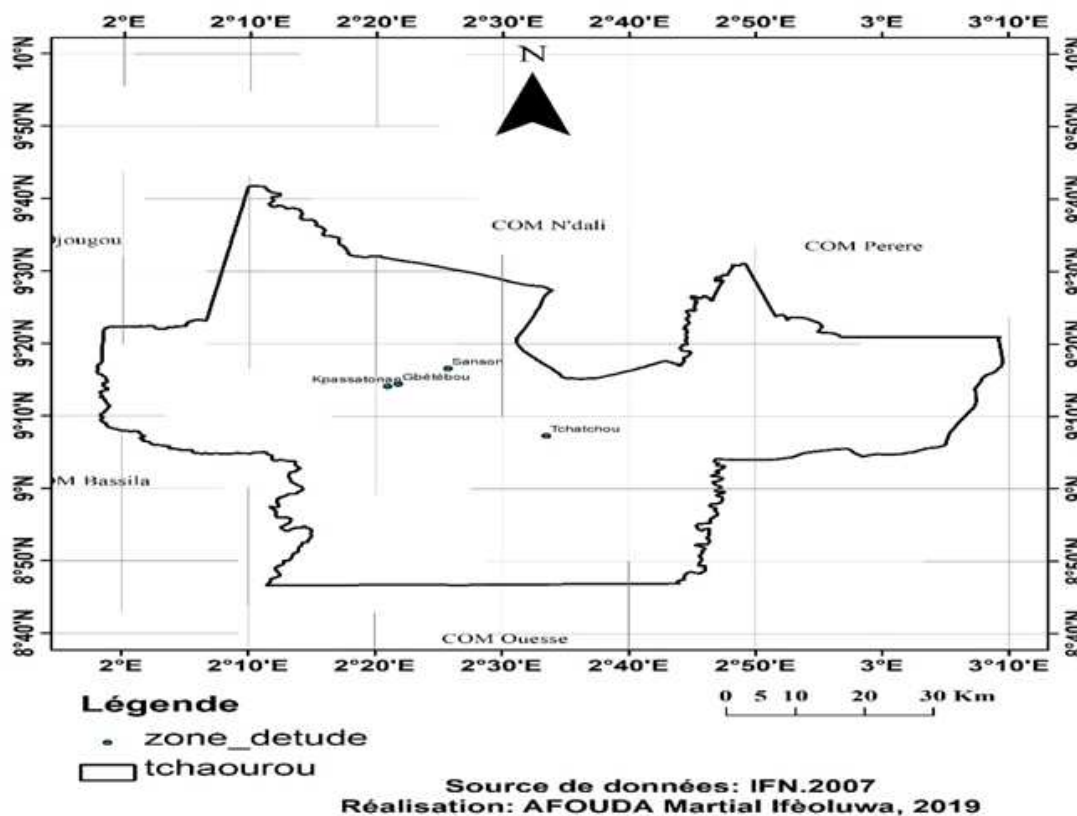


Figure 1: Carte de La Commune De Tchaourou.

Sampling and Database

The sample in this study consists of soybean producers who completed the training at least one year ago. This choice was made in order to take producers who had time to apply the training instructions during a crop year after the training. Similarly, the choice of soybean producers is essentially based on the availability and accessibility of a list of producers trained in the DEDRAS-NGO approach. 84 producers were sampled from an available list of 120-trained producers. In fact, nearly 500 producers have been trained in the municipality in the EEA approach. However, for reasons of sample availability, only a list of 120 producers could be obtained. These producers were chosen randomly and simply with random sorting on Excel. In doing so, the study was conducted in four villages (Gararou, Soumon, Sanson and Kpassatona) of the commune but given the realities of the field, the number of producers surveyed varies per village from 15 to 25.

In general, the data were collected through the mixed method, which consisted of the collection of both qualitative and quantitative data. These include data on socio-demographic characteristics; the general assessment of the training and the EEA application booklet. These data were obtained using a questionnaire administered to the surveyed producers.

Data Analysis

The analysis of the data was done using descriptive statistics and the Tobit model (Ouédraogo, 2007), which enabled respectively to measure the filling frequency of the EEA tools and to identify the determinants of the degree of filling of these tools. Software tool by name, Stata 13 was used for these analyzes. The filling frequencies represent the proportions of producers fulfilling the EEA tools. Table 1 below presents the tools contained in the EEA application booklets shared with the producers at the end of the training.

Table 1: Présentation Des Outils EEA

Sl. No.	Outils EEA	Contenu
1	Cultural calendar	allows the producer to plan for input resources and timely implementation of the various agricultural activities
2	Tracking Cash Outings	provides information on the various expenses related to the operation, carried out throughout the campaign, their costs and the dates on which they were carried out
3	Tracking Cash Entries	provides information on the revenue from the sale of products harvested at the end of the marketing year and the dates on which these revenues were obtained
4	Analysis of money inflows and outflows (before and after production)	Inventory of expenditures and cash inflows by crop, assess their gross margin and unit costs of each product in order to make objective decisions of crop choice and production techniques
5	Financial Calendar	provides information on monthly production and household expenses and income inflows; allows the producer to know the months; allows targeting of savings and investment periods for good financial management of the farm
6	Evaluation of the year of production	provides the data (costs, production and gross margins) of the different crops on their farms in a single table and, secondly, to take stock of the campaign
7	Refund Journal	provides information on credit information, credit objectives, amounts, conditions (interest rates, maturities) and schedules / credit repayment schedules

Source: Inspiré de Sogan, 2014

Specification Du Modele

For the analysis of the adoption of an innovation, the simple linear models Probit, Logit, or Tobit can be used (Ouédraogo et al., 2007). Simple linear models analyze the influence of factors determining the level of adoption of innovation (Ouédraogo et al., 2007). The Probit and Logit models are limited to the analysis of the adoption decision, which is, to the analysis of the influence of the factors determining the probability of adoption, without addressing the intensity of adoption. Innovation (Mariano et al., 2012, Kpade et al., 2018, Issoufou et al., 2016). The Tobit model, on the other hand, makes it possible to analyze the factors influencing the level of adoption of innovation (Ouédraogo et al., 2007). The Tobit model was chosen for this study because the objective is not only to identify the determinants of the filling of the EEA tools but also those influencing the degree of filling thereof. Considering that we are dealing with eight tools and that the number of tools filled and the degree of filling of each tool vary from one producer to another, let us define, IG_i as being the index of global filling intensity of all EEA tools by the producer i . This global indicator is obtained by summing the tool filling indices for each producer i (I_{ij}) and is therefore defined as follows:

$$IG_i = \sum I_{ij} = \sum A_{ij} N_{ij}$$

Recall that $I_i = A_{ij} N_{ij}$ is the index of filling intensity of each tool j . With A and N respectively the dichotomous filling variable and the fill level of the tool j by the producer i . A takes the value 1 if the producer uses and 0 if he does not use. N is obtained by the following method taking into account the realities of the field: 1 if the tool j is partially filled (filled partially) and 2 if it is completely filled (filled completely).

Following Mbétid-Bessane (2014), consider IG^* , the latent variable denoting the filling intensity of the tool EEA j filled by the producer i and the value of which depends on a series of explanatory variables X_i . We can write the following equation:

$$IG^*_i = \beta X_i + \mu_i ;$$

IG^* is not being observable: it is observed only if its value is greater than 0. We can thus construct a variable IG_i , which is equal to IG^*_i when it is observable and which is 0 by convention when IG^*_i is not observable. β being the coefficients, X_i the explanatory variables and μ_i is the error term independently and identically distributed according to the normal law. Considering the field specifications, a number of socio-economic characteristics were introduced in the Tobit model. These are: levels of primary, secondary and university education, assistance provided in the filling of tools by the educated children of the respondents, access to credit, belonging to a producer group, owning capital, experience in agriculture, experience in EEA, contact with extension service, area of soybean, secondary activity, and level indicator Entrepreneurial producers.

Table 2: Explanatory Variables of the Regression Model

Variables	Types	Modalités	Signes Attendus
Primary, Secondary and university Level	D	0=No, 1 = Yes	+
Help in filling	D	0=No, 1 = Yes	+
Access to credit	D	0=No, 1 = Yes	+
Membership of a Group	D	0=No, 1 = Yes	+
Possession of Capital	D	0=No, 1 = Yes	+
Experience in Agriculture	C	In number of year	+
Experience in EEA	C	In number of year	+
Contact with extension service	D	0 = No, 1 = Yes	+
Soy Area	C	In cultivated Hectare	+
Secondary Activity	D	0 = No, 1 = Yes	-
Entrepreneurial Level Indicator	C	Calculated index	+

Source: 2015 Investigations Results

From the signs of β_i and their significance, the determinants of the degree of filling of the EEA tools by the producer are identified.

Methodology for Calculating the Entrepreneurial Level Indicator Variable

The goal of the training is to make producers real entrepreneurs. As a result, an entrepreneurial level indicator was calculated based on score carded criteria to determine its impact on the degree of filling of the tools. These criteria come from the main entrepreneurial lessons recorded in the thematic modules of the training. In total, the training in EEA is divided into eleven (11) thematic modules, the eleventh of which is nothing other than the EEA application book, which includes the tools whose evaluation of the determinants of adoption is made in this study. Indeed, we have assigned to the modalities of each chosen criterion, a score according to whether the answer is good or not. A good answer in the context of the study means recognizing or respecting a recommendation from the EEA training. Thus, a score interval between [0; 1] has been defined. As a result, the score 0 means a bad (practice to be discouraged) answer given by the respondent; the score 0.5 means a non-recommended but acceptable response (the middle ground for lack of means or strict compliance with the recommendation) and score 1 is the right answer (recommendation most recommended). Table 3 below presents each criterion with the level of measurement and the thematic module from which it was drawn:

Table 3: Breakdown of Entrepreneurial Level Measurement Criteria According to EEA Thematic Modules

Topical Modules	Content	Criteria	Measure Level
Module 1 " Making the agent with agriculture "	Prepares producers to recognize their operation as a business and to consider themselves an entrepreneur	Perception of exploitation (C1)	0 = field; 0.5 = agricultural domain; 1 = business
Module 2 " Know the units to know your resources "	Shows producers the benefit of knowing the real areas of plots in the farm for better planning and use of resources in input and labor	Perception of the best measuring instrument of its plot (C2)	0 = not; 0.5 = rope; 1 = dekameter
Module 3 " Manage your farm for enough food "	Sensitizes producers on good nutrition, product diversification and practical arrangements to ensure food security.	Perception of the strategy to adopt to ensure household food security (C3)	
Module 4 " Exit and Money Entry-Know if you are doing good business? "	Teaches farmers how to develop an operating account and make profit calculations (gross margin) both in the forecasting phase and real.	Strategy to be adopted to know if we are doing good business (C4)	0 = purchase of food; 0.5 = crop reserve; 1 = plan availability and food shortage
Module 5 " Decisions to make good business "	Sensitizes producers on the economic and environmental benefits of adopting improved agricultural practices.	Using improved seeds to do good business (C5)	0 = total product * price; 1 = money I / O
Module 5	Same	Using fertilizer to do good business (C6)	0 = no; 1 = yes
Module 5	Same	Respect technical itinerary to make good business (C7)	0 = no; 1 = yes
Module 6 " Seizing opportunities to diversify your farming activities for more income throughout the year "	Teaches producers to analyze business opportunities, market and production risks and the need to diversify agricultural crops and activities to cushion the effects of potential risks.	Classification of cash crops on a profit basis (C8)	0 = no; 1 = yes
Module 7 " Manage your money throughout the year "	Teaches producers the basics of good financial management.	Planning of field and household expenses for this year (C9)	0 = no; 1 = yes
Module 8 " How to get good financial services "	Sensitizes producers on the importance and benefits of saving their	Saving surplus money (C10)	0 = no; 1 = yes

	savings and obtaining credit in financial institutions		
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Source: 2015 Investigation Results

Knowing that the level of entrepreneurial spirit varies from one producer to another, let us define I_i as the composite indicator of the level of entrepreneurial spirit by the producer i . This indicator is obtained by the sum of the criteria of measurement of the entrepreneurial spirit for each producer i (C_{ij}) and is thus defined as follows: j represents each criterion. Then, according to the value of the indicator [0-10] calculated one has low entrepreneurial level if $I_i < 5$, and high entrepreneurial level if $I_i > 5$.

RESULTS

Descriptive Statistics

The results of the descriptive analysis (Table 4) shows that only 23.8% of the producers are educated, i.e. 10.7%, 11.9% and 1.2% who have reached primary, secondary and university level respectively. More than half of the producers (58.3%) are engaged in a secondary activity. 28.6% are in contact with an extension service and 78.6% belong to a group. 64.3% of the producers own a capital and only 21.4% are helped in the filling of the EEA application books. The experience of producers in agriculture and in training is 27.7 years and 3.7 years respectively. The average indicator of the entrepreneurs' level of entrepreneurial spirit is 5.9 with a standard deviation of 1.6.

Table 4: Descriptive Statistics of the Explanatory Variables of the Regression Model

Qualitatives Variables	Absolute Frequency	Absolute Frequency
Formal education	20	23,8
Secondary activity	49	58,3
popularization	24	28,6
Group	66	78,6
Credit access	15	17,9
Possession of capital	54	64,3
Fill help	18	21,4
Quantitative variables	Average	SD
Agricultural experience	27,7	12,9
Experience in EEA	3,7	0,5
Entrepreneurial level	5.8	1,6

Source: Resultats d'Enquete 2015

Measuring the Filling Rate of EEA Tools

Figure 2 below shows the filling frequencies of the cultural calendar tools (31%), silver inputs (9.5%), silver input-output before production and the silver output tool (29, 8%). These filling frequencies are low compared to the total number of EEA producers. Figure 3 shows that only 4.8% of producers complete input-output tools after production, production year assessment and financial calendar. As for the repayment journal, only 3.6% of producers fill it. In general, these four tools are also filled weakly.

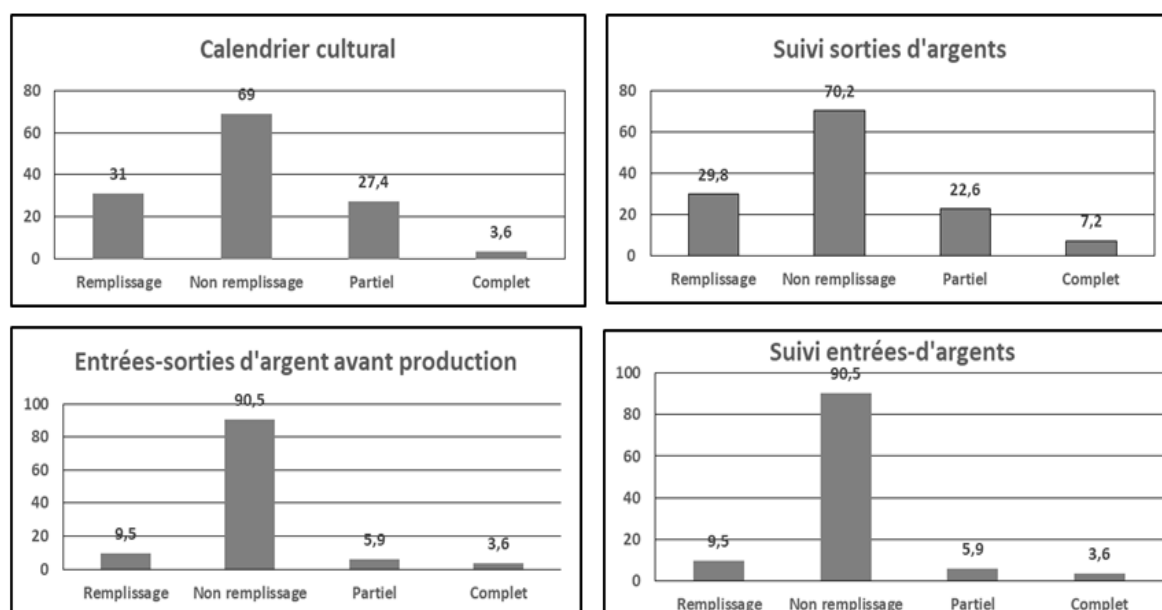


Figure 2: Distribution of Respondents According to the Frequency and the Level of Filling of the Cultural Calendar Tools, Follow-up of Cash Inflows, Entry-Exit of Money before Production and Follow-up of Cash Outflows.

Source: 2015 Investigations Results

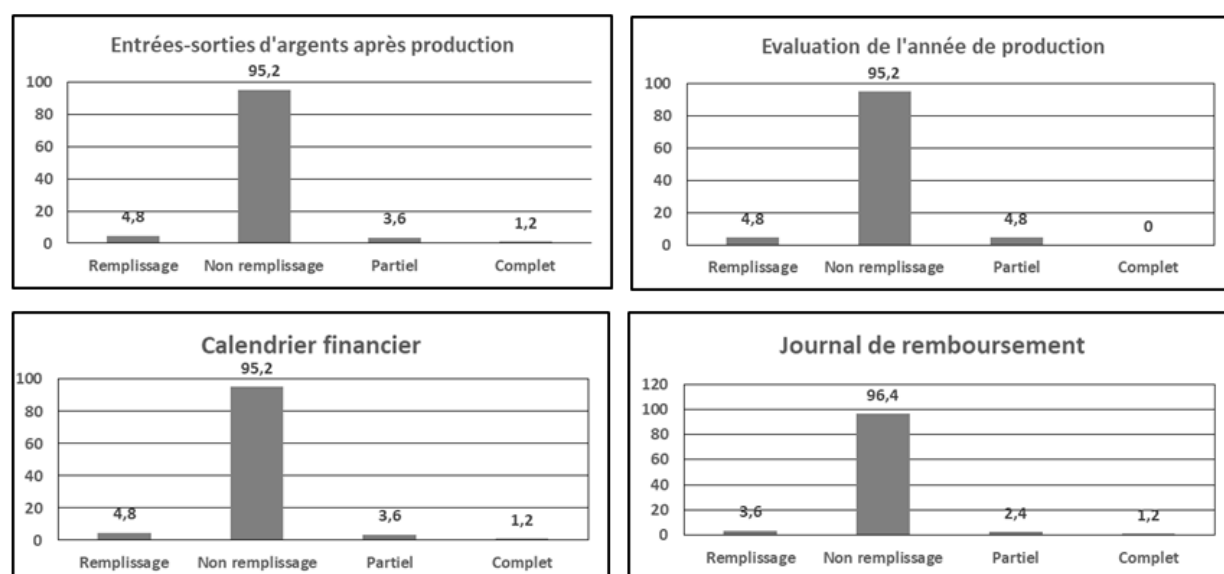


Figure 3: Distribution of Respondents According to the Frequency and Level of Filling of the Input-Output Money Tools After Production, Evaluation of Production Year, Financial Calendar and Repayment Log.
Source: 2015 Investigations Results

The two figures, it is clear that all eight (08) EEA tools are poorly filled. How to explain the low frequency of filling of these tools?

Statistique Descriptive Des Indicateurs Calcules

Table 5 presents the statistics of the intensity of adoption of the EEA tools and the indicator of the entrepreneurial level. This table shows that the average filling intensity index is 1.3 (partial filling level) and that of the entrepreneurial level indicator is $5.8 > 5$, i.e., a high entrepreneurial level.

Table 5: Descriptive Statistics of the Dependent Variable and the Entrepreneurial Level Indicator

Variables	Average	Standard D	Minimal	Maximal
Intensity of Adoption	1.3	2.1	0	10
Entrepreneurial Level	5.8	1.6	2	9

Source: 2015 Investigation Results

DETERMINANTS OF THE DEGREE OF FILLING TOOLS EEA

The results of the Tobit regression model estimation by the maximum likelihood procedure are shown in Table 6. Although the pseudo $R^2 = 0.23$ is small, the likelihood ratio (LR) is statistically significant at 1%. Thus, the model is globally acceptable. The pseudo R^2 indicates that 23% of the variations of the dependent variable are due to the variables introduced into the model. Secondary and university level variables, assistance in filling, access to credit, ownership of capital and contact with an extension service have a positive and significant effect on the degree of filling of tools ACS. On the other hand, the exercise of a secondary activity is significant and has a negative effect on the degree of filling of the EEA tools by the producers. In addition, the level of primary education, membership in a group, experience in agriculture, experience in the EEA and the indicator of the entrepreneurial level have a positive but not significant effect on the degree of education filling of EEA tools by producers. Similarly, the area of soya planted by the producer has a negative and insignificant effect on the degree of filling of the EEA tools.

DISCUSSIONS

Producers poorly complete the EEA application booklet consisting of tools for planning, management, evaluation and decision-making by producers. The filling frequencies obtained for each tool are relatively small compared to the total number of EEA producers. Several factors are at the root of such a situation. Indeed, the levels of secondary and university education are decisive in the decision-making concerning the filling of these tools because it requires a minimum of knowledge and a strong sense of analysis that the producer is called to develop. This means that the higher the level of education, the higher the ability to complete the EEA tools. This result is in line with the realities of the Conseil à l'Exploitation Agricole Familiale (CEF) whose filling of the tools requires that the farm manager has a sufficient level of writing (French or national languages) and calculation to be able to join the consultancy program. (Dugue and Faure, 2003, p24).

In addition to the level of education, help in filling (by the educated children of producers) tools that motivates the producer to appropriate them. This result seems significant because only 23.80% of the EEA producers are educated. But, EEA application books being in French, this prevents uneducated producers from completing these tools. Only with the help of their children or educated friends can these producers successfully complete the EEA tools. This brings formal education back to the top of the box. Access to credit has a positive and significant effect at 5% on the degree of filling of EEA tools. This result could be explained by the fact that the agents of the microfinance institutions in this commune condition the access to the credit by the maintenance and update of the notebooks of application. This forces producers to keep and update their notebooks (Sogan, 2014). The work of Aihounton (2013); Ouedraogo et al. (2010); Rabe et al. (2017) and those of Mbétid-Bessane (2014) illustrate the importance of credit as one of the potential determinants of producers' behavior in the face of innovation.

Ownership of capital allows the producer before the start of production activities, to plan his activities and production expenses in order to use his capital efficiently. This would explain the filling of a number of tools such as the cultural calendar and the financial calendar. Although the contexts are different, Yegbemey et al. (2014), in a context of

adaptation to climate change, had already emphasized capital ownership as a major determinant of the economic performance of the farm through the adoption of effective strategies. The contact with an extension service facilitates the filling of the EEA tools by the producer, because in the presence of the managing agent, the producer benefits from ample explanations and follow-up in the filling of the tools. This result corroborates with those of many authors (Aihounton, 2013, Tene Mabah et al., 2013, Mbétid-Bessane, 2014, Abebe et al., 2015 and Issoufou et al., 2017). All these studies have reached the conclusion that contact with an extension service conditions the adoption decisions of agricultural producers.

A secondary activity by the producer has a negative and significant effect at 10% on the degree of filling of the EEA tools. Although this result, contrasts with that of Aihounton (2013), (positive and significant effect at 10%) which had highlighted the importance of secondary activity in the decision of adaptation of producers to climate change through access to financial resources to finance activities or the cost of adaptation, the secondary activity in this case is negatively correlated with the filling of EEA tools. It should also be noticed that more than half of the producers have a secondary activity (58.30%) and therefore depend on other activities other than agriculture. This could mean that when the producer has activities other than agriculture (second source of income), he or she mobilizes less time in filling the tools. Although many studies (Chebil et al., 2013, Ahouandjinou and others 2010, Aihounton, 2013) have shown that belonging to a producer group is a potential determinant of adoption decisions in rural areas, in the case of 'species (positive effect not significant) it does not influence the filling of EEA tools. In addition, group membership is an appropriate framework for learning and sharing experiences. According to the organizational arrangements of the EEA training, there should be focal points in the groups, able to help producers who have difficulties in using the EEA application book to be able to do so. However, the dysfunctions linked to leadership have not allowed the producer members to benefit from the support of the focal points. Similarly, the level of primary education, experience in agriculture, experience in the EEA and the indicator of the entrepreneurial level do not have a significant effect on the degree of replenishment of the EEA tools by the producers. This reflects the fact that it is not a matter of being experienced or respecting the practical entrepreneurial advice received to be able to fill the tools, but of having a high level of education (reading and writing in French but also have a sense of analysis). The soybean area sown by the producer has a negative and insignificant effect on the degree of filling of the EEA tools. The filling of the EEA tools is less restrictive for producers who have a small area compared to those who sign large areas and have large loads, large farms requiring more productive resources to record in tools and therefore more of toil. The use of the EEA application book, what is the implication today for small farms? The evolution of farms towards professionalization and agricultural entrepreneurship through the planning, management and evaluation of their activities, allows them to be efficient and competitive. The appropriation and filling of the tools contained in the EEA books make producers real entrepreneurs in practice able to better manage their farms for enough income and food.

Table 6: Summary of the Results of the to Bit Model

Variables	Coefficient	Erreur Type	T	P>t
Primary level	0,0514101	0,9304346	0,06	0,956
Secondary level	4,202038	1,270732	3,31	0,001***
University level	5,826679	1,143501	5,10	0,000***
Help in filling	5,502742	0,9143034	6,02	0,000***
Access to credit	2,318065	1,042877	2,22	0,029**
Group	0,0428236	1,18135	0,04	0,971
Possession of capital	1,991444	0,8068389	2,47	0,016**
Agricultural experience	0,0187947	0,282152	0,67	0,507
Experience in EEA	0,239443	0,6430093	0,37	0,711
popularization	2,060263	0,9787793	2,10	0,039**

Soy area	-0,780999	0,7375696	-1,06	0,293
Secondary activity	-1,495816	0,8565136	-1,75	0,085 *
Entrepreneurial level	0,099617	0,2754335	0,36	0,719
Constant	-5,092178	3,101781	-1,64	0,105
Sigma	2,533089	0,3145408		

Model Summary

Number of observations = 84

F (13, 71) = 8,34

Log pseudo likelihood = -97,94

Pseudo R² = 0,23

Prob> F = 0,0000

**Significative values at 10%

**Significative values at 5%

**Significative values at 1%

Source: Investigation Results Analysis, 2015**CONCLUSIONS**

The implementation of the EEA approach has not only led to successes, but also led to recording of low performance. Among these is the low replenishment of EEA tools by producers. The objective of this study is to analyze the determinants of the degree of filling of these tools by making a case study of soybean producers in the commune of Tchaourou. Thus, based on the results obtained, it appears that the filling of the EEA tools is facilitated by the level of secondary education, assistance in filling, access to credit, possession of capital and contact with an extension service. However, a secondary activity by the producer prevents him from completing the tools. To improve the replenishment rate of the EEA tools by the producers, it will be necessary for the actors involved in the mechanism of implementation of these trainings to combine their efforts to translate the EEA application booklets into the local language in order to make their filling more efficient and their appropriation by the producers; strengthen post-training monitoring; set up a monitoring system close consultation in the filling of tools; repeat the trainings in order to remind the farmers of the approach to the trained producers and make them better master the EEA tools; better orient producers trained on issues of access to quality financial services and the need to have capital at the beginning of the campaign; to help producers better manage their operations, although having other secondary activities to be effective in filling the AES tools.

REFERENCES

1. Abebe D. B., Menale K. 2015. Speed of adoption of improved maize varieties in Tanzania: An application of duration analysis. *Technological Forecasting and Social Change*, 96, pp 298–307. Doi:10.1016/j.techfore.2015.04.007.
2. Ahouandjinou M. C., Adegbola P. Y., Yabi J. A., Adekambi S. A. 2010. Adoption et impact socio-économique de la semi mécanisation du procédé de transformation des amandes de karité en beurre au nord-bénin. Paper presented at the Joint 3rd African Association of Agricultural Economists and 48th Agricultural Economists Association of SouthAfrica, CapeTown, SouthAfrica, 27p. (Disponiblesur: <https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0ahUKEwiwPP8mK3bAhXPCewKHaqhBDQQFggmMAA&url=http%3A%2F%2Fageconsearch.umn.edu%2Fbitstream%2F96186%2F2%2F152.%2520Adoption%2520of%2520semimechanisation%2520in%2520Benin.pdf&usg=AOvVaw0v-YYZjFdO2u87mhC25pQo>). (Consulté le 30 mai 2018).
3. Anandajayasekeram P., Puskur R., Workneh S., Hoekstra D. 2008. Concepts and practices in agricultural extension in developing countries: A source book. IFPRI, Washington, DC, USA, and ILRI, Nairobi, Kenya, 275 P

4. Aihounon D. G. B. 2013. *Adaptation au changement climatique et durabilité économique de l'agriculture: cas de la production du maïs dans le nord-Bénin*. Thèse d'Ingénieur Agronome, Faculté d'Agronomie, Université de Parakou, Parakou, Bénin; 85 p.
5. Akpinfa, E. D., Kissira, A., Akpo, M. A., & Houssou, C. S. 2017. *Evaluation du coût économique de la dégradation des terres dans la zone agro écologique du centre Bénin*. *European Scientific Journal*, 13 (6), pp354–366. Doi: 10.19044/esj.2017.v13n6p354.
6. Alliance for a Green Revolution in Africa (AGRA) (2014), *Africa Agriculture Status Report 2014: Climate Change and Smallholder Agriculture in Sub Saharan Africa*, <http://hdl.handle.net/10568/42343>.
7. Birner R., Davis K., Pender J., Nkonya E., Anandajayasekeram P., Ekboir J., Mbabu A., Spielman D., Horna D., Benin S., Cohen M. 2009. *From “Best Practice” to “Best Fit”. A framework for analyzing pluralistic agricultural advisory services worldwide*. *Journal of Agricultural Education and Extension*, vol. 15, n°4, p. 341–355.
8. Al-Aidi, M. W. S., Al-Dhahi, H. H. K., & Al-Timimi, J. A. F. (2014). *Effect of nitrogenous fertilizers and agricultural sulfur addition on release of calcium and magnesium in some of Iraqi calcareous soils*. *International Journal of Agricultural Science and Research*, 4(1), 59–63.
9. CARE USA. 2013. *The Farmer Field and Business School*. Innovation Brief.
10. Chebil A., Bahri W. et Frija A. 2013. *Mesure et déterminants de l'efficacité d'usage de l'eau d'irrigation dans la production du blé dur: cas de Chabika (Tunisie)*. *NEW MEDIT N*, pp 49–55.
11. Chilemba J. et Ragasa C. 2018. *The impact of a farmer Business School Program on incomes of smallholder farmers: Insights from Central Malawi, Strategy support program, working paper 23, p1–32*. (Disponible sur: <https://www.ifpri.org/cdmref/p15738coll2/id/132679/filename/132776.pdf>). (Consulté le 25 juin 2018).
12. Chipeta S. 2006. *Demand Driven Agricultural Advisory Services*. Lindau, Suisse, Neuchatel Group, GTZ, SDC, AGRIDEA.
13. Davis K. 2008. *Extension in Sub-Saharan Africa: Overview and Assessment of Past and Current Models and Future Prospects*. *Journal of Agricultural Education and Extension*, n°15, p.15–28.
14. Toby, A. J., & Peterside, D. B. (2014). *Analysis of the role of banks in financing the agriculture and manufacturing sectors in Nigeria*. *International Journal of Research in Business Management*, 2(2), 9–22.
15. Djamena Nana P., Djonnawa A., Havard M., Legile A. 2003. *Former et conseiller les agriculteurs du Nord-Cameroun pour renforcer leurs capacités de prise de décision*. *Cahiers Agricultures*, vol. 12, n°4, p. 241–245
16. Djurfeldt G., Aryeetey E. et Isinika A. (eds.). 2011. *African Smallholders: Food crops, markets and policy*, Wallingford, Oxford : CABI.
17. Dugué P. et Faure G., (éditeurs scientifiques), 2003. *Le conseil aux exploitations familiales. Actes de l'atelier sur le conseil aux exploitations agricoles en Afrique de l'Ouest et du Centre, 19-23 novembre 2001, Bohicon, Bénin. Montpellier, France, Cirad, Colloques, 78 p. (ouvrage et cédérom)*. (Disponible sur : hubrural.org/IMG/pdf/conseil_exploitation_familiale.pdf). (Consulté le 13 Juin 2019).
18. Fao, 2016. *L'agriculture en Afrique subsaharienne-Food and Agriculture*, p64. (Disponible sur www.fao.org). (Consulté le 15 août 2017).
19. Kv, R., & Kazi, S. *Urban Agriculture in Cuba and Exploring Possibilities with Reference to Urban India*.
20. Faure G., Dugué P., Beauval V. 2004. *Conseil à l'exploitation familiale : expérience en Afrique de l'ouest et du centre*. Édition ministère des Affaires Étrangères, CIRAD, Montpellier, 128 p

21. Gantoli G. Y. 2013. *Manuel de procédures pour la gestion de la mise en œuvre de l'Approche Ecole d'Entrepreneuriat Agricole*. Programme promotion de l'agriculture, 37 p.
22. GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit). 2012. *A Business Approach to diversification concepts and experience of the FBS: An FBS Approach to Cocoa Farming*. GIZ.
23. Hazell P., Colin P., Steve W. et Andrew D. 2007. *The Future of Small Farms for Poverty Reduction and Growth*. 2020 Document de discussion 42, Washington, DC : Institut International de Recherche sur les Politiques alimentaires.
24. Qamar, K. H., Bhatti, S. A., Nadeem, M., & Hussain, J. A Sociological Study of the Factors Responsible for Low Production Per Acre in Agriculture Sector in District Gujrat.
25. IFPRI. 2005. *The future of small farms: Proceedings of a research workshop*. Washington, DC.
26. Issoufou O. S., Boubacar S., Adam T. et Yamba B. 2017. Déterminants de l'adoption et impact des variétés améliorées sur la productivité du mil au Niger, *African Crop Science Journal*, Vol. 25, No. 2, pp. 207–220.
27. Issoufou O. H., Boubacar S., Adam T. et Boubacar Y. 2016. Modélisation des décisions des agriculteurs sur l'adoption et l'intensification des semences améliorées du niébé au Niger. *Rev. Mar. Sci. Agron. Vét.* 5 (4):405-413. (Disponible sur agrimaroc.org/index.php/Actes_IAPH2/article/download/479/523). (Consulté le 28 Mai 2018).
28. Kpadé P. C. et Mensah E. R. 2013. Facteurs d'adoption de la lutte étagée ciblée au Nord-Bénin. *Économie rurale*, 338 |. (Disponible sur : <http://economierurale.revues.org/4174>). (Consulté en ligne le 28 Mai 2018).DOI: 10.4000/economierurale.4174.
29. MAEP (Ministère de l'Agriculture, de l'Elevage et de la Pêche). 2017. *Plan Stratégique de Développement du Secteur Agricole*, version finale 2017, page 1. (Disponible sur : www.agriculture.gouv.bj/.../synthese_psd2025_pniasan_2021_cadre_prog_cadre_...). (Consulté le 28 juin 2018).
30. MAEP. 2011. *Stratégie de Relance du Secteur Agricole*, pp 25-48. In *Plan Stratégique de Relance du Secteur Agricole*, Cotonou, Bénin, 108 p.
31. Mbetid-Bessane E. 2014. Adoption et intensification du Nouveau Riz pour l'Afrique en Centrafrique. *TROPICULTURA*, 32, 1, pp 16–21. (Disponible sur : www.tropicultura.org/text/v32n1/16.pdf). (Consulté le 30 Mai 2018).
32. Mariano M. J., Villano R. et Fleming E. 2012. Factors influencing farmers' adoption of modern rice technologies and good management practices in the Philippines. *Agricultural Systems*, 110 (2012) 41–53. DOI: 10.1016/j.agsy.2012.03.010.
33. Moumouni I., Vodouhé S. D., Streiffeler F. 2009. What Makes Small-Scale Farmers Participate in Financing Agricultural Research and Extension? Analysis of Three Case Studies from Benin. *Journal of Agricultural Extension and Education*, vol. 15, n°3, p. 301–316.
34. Moumouni I., Labarthe P. 2012. Institutionalization of knowledge sharing platforms in the last three decades in Francophone Sub Saharan Africa. 10th European IFSA Symposium, Producing and reproducing farming systems: new modes of organization for the sustainable food systems of tomorrow, Aarhus, Denmark, July 1–4.
35. Ouédraogo M., Dembélé Y., Somé L. 2010. Perceptions et stratégies d'adaptation aux changements des précipitations : cas des paysans du Burkina Faso. *Sécheresse*, 21 (2), pp 87-96. Doi: 10.1684/sec.2010.0244.
36. Ouédraogo S., Doanio H. 2007. Déterminants de la consommation de lait frais pasteurisé local à Ouagadougou au Burkina Faso. *Revue Éleveurs Médecins Vétérinaires*, 60 (1-4), pp 59–65. (Disponible sur : revues.cirad.fr/index.php/REMVT/article/download/9978/9972). (Consulté le 30 mai 2018).
37. Rabe M. M., Baoua I., Adeoti R., Sitou L., Amadou L., Pittendrigh B. et Mahamane S. 2017. Les déterminants

- socioéconomiques de l'adoption des technologies améliorées de production du niébé diffusées par les champs écoles paysans dans les régions de Maradi et Zinder au Niger, *International Journal of Biological and Chemical Sciences*, 11(2): 744-756. DOI : <https://dx.doi.org/10.4314/ijbcs.v11i2.17>.
38. Sall M. 2015. *Les exploitations agricoles familiales face aux risques agricoles et climatiques : stratégies développées et assurances agricoles*. Hal. Economies et finances. Université Toulouse le Mirail –Toulouse II. Français. <NNT : 2015TOU20063>. <tel-01342523>, pi. (Disponible sur : <https://tel.archives-ouvertes.fr/tel-01342523/document>). (Consulté le 28 mai 2018).
 39. Service de l'Analyse de la Sécurité Alimentaire. 2013. *Analyse Globale de la Vulnérabilité et de la Sécurité Alimentaire (AGVSA), Rapport du Programme Alimentaire Mondial, Cotonou, Bénin*, 65 p.
 40. SNRD (Sector Network Rural Development Africa). 2015. *Experiences with the Farmer Business School (FBS) approach in Africa*. GIZ.
 41. Sogan R. 2014. *Expérience du Bénin dans la mise en œuvre des Ecoles d'Entrepreneuriat Agricoles. Rapport d'étude d'évaluation d'impact*, Cotonou, Bénin, 29 p. (Disponible sur : https://agrodevbenin.files.wordpress.com/2015/02/2014_eeaexperience_bc3a9nin.pdf). (Consulté le 30 Mai 2018).
 42. Soullier G., Moustier P., Bourgoin J. et Ba A. 2018. « Les effets des investissements d'agrobusiness sur les agriculteurs familiaux. Le cas de la vallée du fleuve Sénégal », *Économie rurale*, 2018/4 (n° 366), p. 61–79. URL : <https://www.cairn.info/revue-economie-rurale-2018-4-page-61.htm>.
 - Yegbemey R. N., Yabi J. A., Aïhounton G. D. B., Kokoye S. E. H. 2014. *Economic valuation of maize farming profitability under climate change adaptation in Benin, West Africa*. *Int. Journal. Agricultural Resources, Governance and Ecology*, Vol. 10, No. 3, 12 pp: 269-28. DOI 10.1504/IJARGE.2014.064006.
 44. Tene Mabah G. L., Havard M. et Temple L. 2013. *Déterminants socioéconomiques et institutionnels de l'adoption des innovations techniques concernant la production de maïs à l'Ouest du Cameroun*, *TROPICULTURA*, no. 19 :137–42. (Disponible sur : http://publications.cirad.fr/une_notice.php?dk=572422). (Consulté le 30 Mai 2018).
 45. Wallace I. 1997. *Agricultural education at the crossroads: present dilemmas and possible options for the future in Sub-Saharan Africa*. *International Journal of Educational Development*, vol. 17, n°1, p.27–39.

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